

CLAIMS

1. Fuel rod for a nuclear reactor which is cooled by water, comprising a cylindrical tubular cladding (2), a column of nuclear fuel pellets (3) which are stacked one on top of the other inside the tubular cladding (2), in the axial direction (7) of the cladding (2), a first plug (4, 10) for tight closure of a first axial end of the cladding (2) of the rod (1) arranged at the lower portion of the fuel rod (1) when the rod (1) is in an operating position inside the nuclear reactor, the cladding (2) of the rod (1) having its axis (7) vertical, and a second plug (5) for tight closure of the second axial end of the cladding (2), the column of fuel pellets (3) resting on an inner portion (4a, 10a) of the first plug (4, 10), referred to as the lower plug, via a first lower end, and being retained inside the tubular cladding (2) by means of a compression spring (8) which is interposed between a second upper axial end of the column of fuel pellets (3) and an end of an inner portion of the second plug (5), referred to as the upper plug, characterised in that the inner portion (10a) of the lower plug (10) engaged inside the tubular cladding (2) successively comprises, in the axial direction (7) and in the direction from the first towards the second end of the cladding (2), a first cylindrical portion (11) which has a diameter which is substantially equal to the inner diameter of the tubular cladding (2), a second cylindrical portion (12) which has a diameter which is smaller than the inner diameter of the tubular cladding (2) and a third cylindrical portion (13) which has a diameter which is smaller than the inner diameter of the tubular cladding (2) and which is greater than the diameter of the second cylindrical portion (12) so that there remains, between the lateral outer surface of the third

cylindrical portion (12) and the inner surface of the tubular cladding (2), a radial clearance for passage of gas and a substantially planar end surface (14) on which the first end of the column of fuel pellets (3) rests, so that an annular space (16) for expansion of gas is formed between the outer surface of the second portion (12) of the inner portion (10a) of the lower plug (10) and the inner surface of the cladding (2).

2. Fuel rod according to claim 1, characterised in that the third cylindrical portion (13) of the inner portion (10a) of the lower plug (10) of the fuel rod (1) has a diameter such that there remains, between the outer lateral surface of the third cylindrical portion (13) and the inner surface of the tubular cladding (2), a radial clearance (15) for assembly and passage of gas of between one and two tenths of a millimetre.

3. Fuel rod according to either claim 1 or claim 2, characterised in that the second cylindrical portion (12) of the inner portion (10a) of the lower plug (10) has a diameter of between 40% and 60% of the inner diameter of the tubular cladding (2) and a length in the axial direction of between 8 and 10 times the inner diameter of the tubular cladding (2).

4. Fuel rod according to any one of claims 1 to 4, characterised in that at least a portion of the fuel pellets (3) of the column of fuel pellets comprises plutonium oxide or a mixed oxide of uranium and plutonium.

5. Fuel rod according to any one of claims 1 to 4, characterised in that it further comprises, in at least one zone of the second cylindrical portion (12), extending in an

axial direction, at least one cross-member (17) which is constituted by a diametrically widened cylindrical portion of the second cylindrical portion whose outer diameter is substantially equal to the inner diameter of the tubular cladding (2) which is reduced by an assembly clearance.